APPLICATION FOR A SCIENTIFIC RESEARCH AND COLLECTING PERMIT

United States Department of the Interior

National Park Service

All or some of the information you provide may become available to the public.

OMB # 1024-0236
Exp. Date 04/30/2017
Form No. 10-741a

Name of the National Park Service area you are applying to: Cape Cod

Type of application:	**Please enter numbers for permit renewal or modifiecation requests:**
New application	**Previously assigned NPS study number:**
	Previously assigned NPS permit number:

Contact information for the current principal investigator

Principal investigator: Dr Christopher Sherwood	**Office phone:** 508 457 2269
Mailing address of principal investigator: 384 Woods Hole Road Woods Hole, MA 02543 United States	**Alternative phone:** 774 269 9399 **Office fax:** 508 457 2310
Name of the current institution represented Dept. of the Interior U.S. Geological Survey	**Office email address:** csherwood@usgs.gov

Additional investigators or key field assistants (first name, last name, office phone, office email)

Name: Christopher Sherwood **Phone:** 508 457 2269 **Email:** csherwood@usgs.gov

Scientific Study Information

Study Title (maximum 300 characters)

Rapid-response mapping of coastal landscape change with UAS: Proof of concept

Purpose of the study (maximum 4000 characters)

The purpose of this study is to evaluate the feasibility, cost, and data quality of mapping a variety of coastal landscapes (beachs, dunes, bluffs, overwash channels, back-barrier marshes) using a camera mounted on an unmanned aerial system (UAS).

Summary of proposed field methods and activities (extract from the study proposal where appropriate - maximum 4000 characters)

1) UAS flights - A series of UAS flights will be flown along overlapping flightlines over the survey area. Flights will be launched and landed from an open, unoccupied location (e.g., a beach, parking lot, or lawn) with good sitelines and no overhead obstructions (e.g., trees, powerlines, towers). Flight levels will be limited to <400 feet above ground levels and kept within line-of-sight, and flights will be visually monitored by certified operators. Target regions to be mapped are sandy beach environments with sparse vegetation, bluffs and dunes, vegetated uplands, and wetlands, including vegetated marsh and unvegetated tidal flats. Portions of flights will be over water. The aircraft will be a FAA-approved rotary-wing (helicopter) or fixed-wing aircraft with camera, GPS, radio-control, and autopilot capabilities. The UAS will be operated in accordance with a valid Certificate of Authorization according to FAA regulations.
2) Ground-control markers
Ground-control markers will be deployed by project personnel and surveyed in with differential GPS. Each of the approximately 10-15 markers will be made of durable fabric and placed on the ground temporarily during overflights. They will be deployed by foot by (a) team(s) of two, who will also survey their location. A temporary GPS base station will be established on the lawn of the old Coast Guard building during survey days.
3) Ground-truth surveys
Walking surveys with continuously recorded differential GPS data, photos, and field notes describing vegetation cover (including canopy height) and ground texture will be made during the overflights. These surveys will be conducted by the same team(s) that deploy and recover the ground-control markers.
4) Construction of orthophotomosaic, digital surface map, and digital elevation map.
Software will be used to mosaic the images, rectify the mosaic with the ground-control points, and construct a digital elevation map using structure-from-motion algorithms. These activities will take place at the USGS offices.

Study Schedule	**Field Schedule**

Initial starting date of the study: Feb 29, 2016	**Date to begin study within the park this application year:** Feb 29, 2016
Estimated date the entire study may end: Mar 30, 2018	**Date to end study within the park this application year:** Mar 30, 2018

Activity Type:
Research

Do you anticipate receiving funding assistance from the U.S. Federal Government for this study? (Yes or No)
Yes

If yes specify the agency(s):
Dept. of Interior - U.S. Geological Survey

Where will data, maps, photos, etc. (not specimens) reside upon completion of this study?
All products will be archived by the U.S. Geological Survey and be publicly accessible via USGS websites and through data.gov.

Location(s) where you propose activities will take place within the National Park System area(s):
Beaches, bluffs, dunes, and marshes adjacent to Coast Guard Beach, extending to Nauset Inlet.

Your proposed method of access (vehicles, aircraft, boat, snowmobile, foot, etc.):
Access will by vehicle on park roads and parking lots. Access to beaches will be by foot. Access to Nauset Spit and intertidal areas will be by small outboard skiff operated by trained and properly equipped personnel. Aerial Surveys with an unmanned aerial system (UAS) will be conducted from elevations of 100 to 400 ft.

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information form is estimated to average 1.38 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3130 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.
Privacy Act Notice: Scientific research, education and collecting activities within units of the National Park System that may impact parks invoke a permitting and reporting requirement per regulations at 36 CFR 1.6 (Permits), 36 CFR 2.1 (Preservation of Natural, Cultural and Archeological Resources), and 36 CFR 2.5 (Research Specimens). The National Park Service collects information about permit applicants and permittees to administer and document research, collecting, and reporting activities within parks. The information disclosed on this form is required and may result in denial of permit applications if not provided.